Joint Workshop 7: Real-time Analysis of Synchrotron Light Source and Nanoscale Research Center Data Using AI/ML for APS-U First Experiments

Wednesday, April 19, Morning

9:00 – 9:10   Nicholas Schwarz, Subramanian Sankaranarayanan, Mathew Cherukara, and Chengjun Sun (Argonne National Laboratory)
Welcome and Introduction

Session 1: Autonomous Experiments
Chair: Nicholas Schwarz

9:10 – 9:40   Sergei Kalinin (University of Tennessee, Knoxville)
Machine Learning and Automated Experiment in Microscopy: Workflow Design, Forensics, Explainability, and Human-in-the-loop Interventions

9:40 – 10:10   Bobby Sumpter (Oak Ridge National Laboratory)
Towards Autonomous Discovery of Thin Film Functionalities

10:10 – 10:30   Break

Session 2: AI/ML for Dynamics Experiments
Chair: Subramanian Sankaranarayanan

10:30 – 11:00   Andi Barbour (Brookhaven National Laboratory)
Enabling Real-time AI-guided Photon Correlation Spectroscopy at CSX

11:00 – 11:30   James Horwath (Argonne National Laboratory)
Understanding Relaxation Dynamics Beyond Equilibrium Using AI-informed X-ray Photon Correlation Spectroscopy

11:30 – 12:00   Michael Servis (Argonne National Laboratory)
Static and Dynamic Critical Phenomena in Rare Earth Separations

12:00   Adjourn Day One

Thursday, April 20, Morning

9:00 – 9:10   Nicholas Schwarz, Subramanian Sankaranarayanan, Mathew Cherukara, and Chengjun Sun (Argonne National Laboratory)
Welcome and Introduction

Session 3: AI/ML for Diffraction Experiments
Chair: Mathew Cherukara

9:10 – 9:40   Howard Yanxon (Argonne National Laboratory)
                *Deploying Machine Learning-based Segmentation for X-ray Diffraction Images at
                Synchrotron Facilities*

9:40 – 10:10   Simon Billinge (Columbia University)
                *AI and Machine Learning-aided Prompt Analysis of Powder Diffraction and
                PDF Data*

10:10 – 10:30   Break

Session 4: AI/ML for Imaging and Spectroscopy Experiments
Chair: Chengjun Sun

10:30 – 11:00   Colin Ophus (Lawrence Berkeley National Laboratory)
                *Programmatic and Deep Learning Analysis Pipelines for 4D-STEM Materials
                Science Experiments*

11:00 – 11:30   Aileen Luo (Cornell University)
                *X-ray Nano-imaging of Epitaxial Thin Film Functional Oxides via
                Cluster Analysis*

11:30 – 12:00   Inhui Hwang (Argonne National Laboratory)
                *Towards Real-time Data Processing and Analysis of X-ray Emission Spectra
                Using AI/ML: Argonne X-ray Emission Analysis Packages*

12:00   Adjourn